

Project Proposal

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Overview

Energy and the Economy. These two subjects are without a doubt inexplicably intertwined. The modern economies of the world rely on energy for transportation, climate control, food, security, data, and the vast majority of ordinary economic activity. Primary energy production is responsible for keeping on the electrical grids that power the computers of corporations, restaurants, and communication networks. Transportation infrastructure relies on the steady and reliable sourcing of petroleum fuels and liquids, although this may soon shift to being more dependent on electricity load of primary energy.

Yes, it is true that the economy relies on energy to maintain its activity levels and expected growth. But to what extent does the infrastructure of the energy industry and its performance have a direct impact on the economy. This is a hard question to answer, especially from a nationwide perspective. Many different economic activities go into the gross domestic product of an economy that make the signals from individual changes difficult to measure. However, if the subject of interest could be reduced to a smaller unit, such as the state-level, or even smaller, individual changes have a better chance of being measured in meaningful ways.

To aid in the evaluation of clean energy technology effectiveness, this project will present a series of data sources relating to legislation, energy, the economy, and how these subjects can be studied in smaller geographic units inside the United States. A comprehensive completion of this project will result in the creation of a database containing data from these sources in an interoperable format that will allow the answer of questions such as:

What areas of my state would best support the adoption of electric vehicles?

Which states provide the largest amount of incentive for Solar (PV) projects, and has this additional funding increased the energy production from solar panels?

Do mandatory green power options decrease the cost of electricity in areas with active regulations supporting the options?

The remainder of this proposal will introduce the data sources, with brief explanations of their content and interoperability. A series of accompanying visualizations will be provided to provide proof of concept for the data.

Data Sources

1) Energy Information Administration (EIA) State Profiles and Energy Estimates (SEDS)

<https://www.eia.gov/state/seds/>

The EIA is a government operated organization responsible for providing Members of Congress, federal and state agencies, and the public with up to date and reliable information regarding the energy production, consumption, prices, expenditures, and other energy indicators. Many reports are created by the EIA to provide annual and monthly summaries of the energy landscape, but the value of the administration for this project lies in the open data available from their website.

Utilizing their OPEN DATA API, information from their State Energy Data Profiles (SEDS) can be collected. This data provides consumption, production, pricing and expenditures, and other indicators at the state level across time. The variables of consumption, production, and pricing and expenditures can be faceted by sector and energy source.

Sectors: Residential, Commercial, Industrial, Transportation, and Electric Power

Energy Sources: Petroleum, Natural Gas, Electricity, Renewable Energy, and Others

The additional indicators included in the SEDS include variables such as Electric Vehicle Stock (registration count), Heating Degree Days, EV Electricity Consumption, Resident Population, and GDP.

The data captured in the SEDS can be totaled up to create national statistics, but the focus of this project is to provide more granular level information. The use of variables such as electricity expenditures in the residential sector can be used to measure the changes in residential energy costs. Paired with production variables, investigation as to how the energy production profile of the state changed with the price of residential electricity can allude to relationships worthy of testing.

*This data is collected from the EIA OPEN DATA API: <https://www.eia.gov/opendata/documentation.php>

2) Database of State Incentives for Renewable and Efficiency (DSIRE)

<https://programs.dsireusa.org/system/program>

Produced by the North Carolina State University's Clean Energy Technology Center. The database provides a consolidated list of all available incentives and programs available by state for clean energy. While in-depth information containing a link to the state legislation code, minimum requirements, incentive amount and other parameters for eligibility can be web-scraped using a more sophisticated web-crawl, basic information regarding the name, state/territory, category, type, along with created and updated date are available in quick export from a table.

The addition of legislation data detailing the changing dynamics of each state's energy landscape provides an opportunity to further understand the differences in state energy profiles. Connecting this data with the SEDS may allude to some obvious trends such as the state with the greatest incentive for solar having the highest production, but it would also allow the price in solar produced energy to be compared between states with few and many incentives for the production of solar energy.

3) Bureau of Labor Statistics (BLS)

<https://www.bls.gov/cpi/>

Another federal government data service, this website provides data about employment and other economic indicators. While labor data can be included if needed, the focus of the BLS data service will be to connect EIA activities and technologies targeted by DSIRE legislation to price inflation. Using the Consumer Price Index (CPI) data sets, changes in goods and services can be measured across states and other geographic areas. While price and expenditures changes in energy are already recorded in the SEDS, the resulting price changes in a final good sourced from an industrial producer are not seen. This could further the narratives of our findings by sharing consumer impacts of energy policy.

4) U.S. Census Bureau

<https://www.census.gov/programs-surveys/economic-census/year/2022/news-updates/ecdata-releases.html#accordion-e149bf3980-item-5a5c52d533>

Data API: <https://api.census.gov/data.html>

Also operated as a federal government agency, the U.S. Census Bureau provides information about the population of the United States and its territories. Aside from population estimates, the Bureau also provides economic surveys (the Economic Census) to estimate the economic activities of a particular unit or region. The Census Bureau also provides the standard for U.S. geographic coding, allowing states to be grouped together into regions, or divided up further into zip codes and census tracts. Use of the Economic Census can allow for a deep dive into the localized impacts of policy.

5) North American Industry Standard Codes (NAICS)

Lastly, a set of industry classification codes used to group economic activities by the federal government. The Energy Information Administration (EIA), Bureau of Economic Activity (BEA), Bureau of Labor Statistics (BLS), and U.S. Census use these codes to classify recorded groups of economic activity. In a robust analysis of the DSIRE policies these codes can be used to match the supported activities and technologies of the DSIRE to economic and energy activities at different geographic levels.